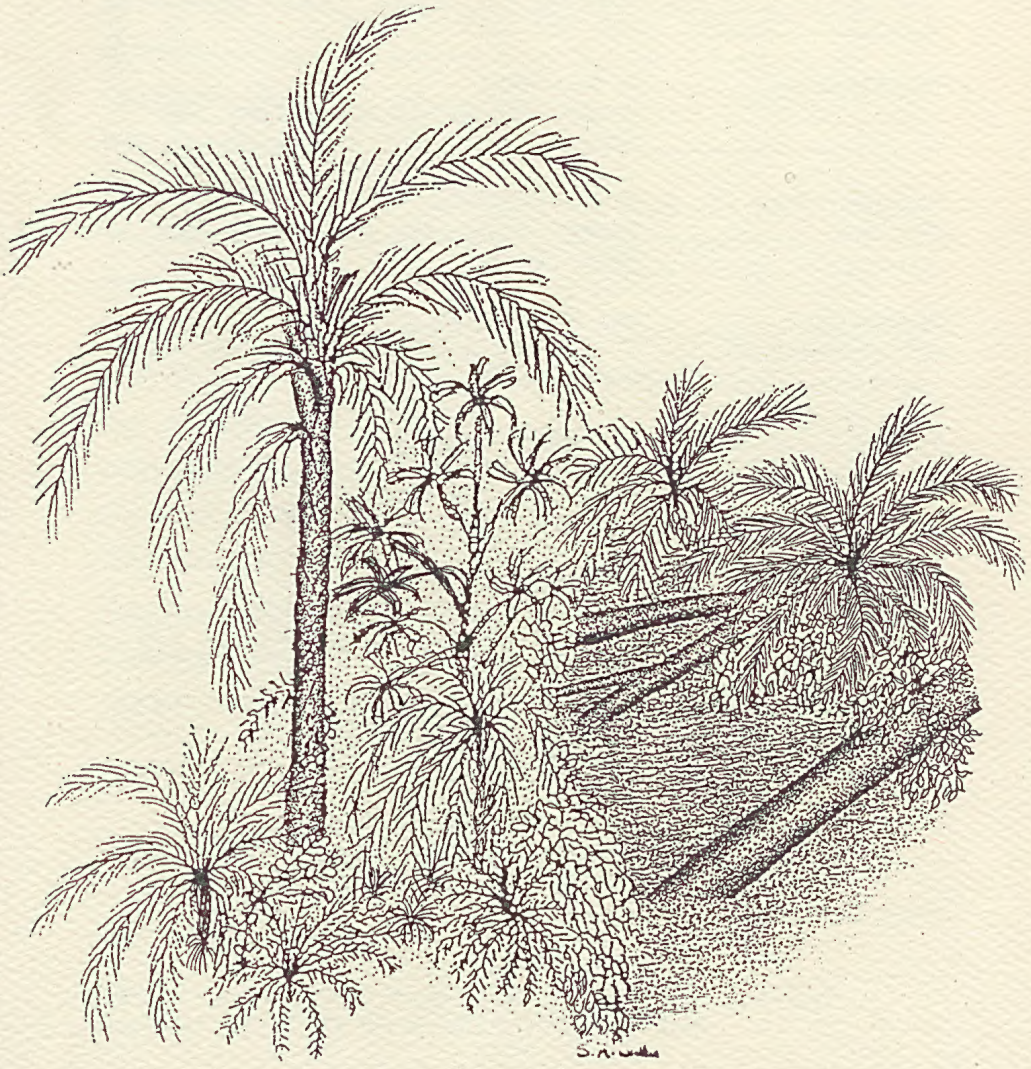
AUSTRALIAN SOCIETY FOR LIMNOLOGY

NEWSLETTER



Volume 26. Number 2. May 1988

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Australian Society for Limnology

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Australian Society for Limnology Newsletter

Volume 26 Number 2 May 1988

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Copy deadline for next issue:

Material for publication in the August issue of the Newsletter should be sent to the Editor before 15 th July 1988.

Fax (09) 332 2507

Australian Society for Limnology

The Australian Society for Limnology is an association of over 400 people with professional or amateur interests related to Australian inland waters. Since its inception in 1961, the Society has played an important role in fostering limnology work in this country. The ASL promotes liaison between limnologists in academic, private and governmental institutions and has a vested interest in the conservation of aquatic and related resources. Annual conferences are held near centres of limnological interest, and the programme includes scientific sessions, field excursions and social activities.

The ASL produces a newsletter with notes on activities, articles of general interest, book reviews and conference announcements; a Bulletin of original scientific papers and occasional Special Publications. A further publication is the Directory of Australian Limnologists.

Membership details

Membership applications are welcome; five classes of subscribing membership are available:

Ordinary Members:	$20.00
Student Members:	$10.00
Life Members:	$200.00
Institutional Members:	Fees on application
Sustaining Members:	Fees on application

Membership subscriptions cover the period from 1 July to 30 June and members receive all publications. Members may also choose to receive the Australian Journal of Marine and Freshwater Research, the Australian Journal of Zoology and/or the Australian Journal of Botany at reduced rates. The subscription period for each journal is the calendar year following the year in which the subscription is paid.

Enquiries relating to membership should be directed to:

Mrs M. Hart
Treasurer/Membership Officer ASL
22 Netherby Avenue
Mulgrave Vic. 3170
(03) 560 4406

EDITORIAL

This issue is largely devoted to the 27 th Congress held on Magnetic Island near Townsville from May 13-15 th, 1988, and includes reflections from the Congress organiser, Richard Pearson, the abstracts of presented papers, and a photographic record of social activities (rigorously edited to protect the Newsletter staff from libel suits and obscenity trials). Richard's notes and comments provide an excellent description of the Congress and so all that is left for me to say is thank you, Richard and co-organisers Ian Campbell, Margaret Hart and Lee Benson, for a highly successful, enjoyable and stimulating meeting.

A topic that attracted some heated debate at both the AGM and the Executive meeting that followed was the proposal to hold the 1990 Congress at Jabiru. There are good reasons for holding the Congress at Jabiru, and these are very convincingly stated in the letters of support received from Peter Tyler and Bill Williams which are printed in this issue. On the negative side however, is the cost of travel to Jabiru and the fact that this may seriously disadvantage many student and other members who wish to attend. The decision to go to Jabiru was finally put to the vote at the Magnetic Island Executive meeting and passed by an almost absolute majority(and this was before the release of Crocodile Dundee II).

The secret to keeping travel costs low is to book Apex airfares or make other arrangements well in advance- so please Max and Doug- can you decide on the dates for the 1990 Congress and let us know in time for publication in the next Newsletter !

Finally, in addition my usual plea to send in letters, articles, State and Territory Affairs , cartoons etc. before the next deadline, is a reminder not to miss reading **Wading at Acheron Creek** and to say - could we have more poems too please - they add a new dimension to limnological activities.

Jenny Davis

★ ★ ★

CONFERENCE THOUGHTS

from Richard Pearson

After the initial hitches, duly acknowledged by the award of the Door Prize to the organisers, the 27th Annual Congress, 1988 (or was it the 28th in 1987?) passed relatively problem-free. Much of the credit for this good fortune rests with the venue (very laid-back, tropical Queensland), and the efforts of Margaret Hart in getting accommodation for everyone, mostly in the room and with the person(s) of their choice.

Sixty-five papers were read, including three keynote addresses in the only plenary session. One paper was presented as a poster, and there was an impromptu verbal presentation on the recent history of and current state of play at the Australian Journal of Marine and Freshwater Research. The papers that I managed to attend were generally of high quality, with one or two quite exciting new areas of research being reported. All the people I spoke to during and after the conference seemed to have got something out of the sessions they attended. The concurrent sessions ran surprisingly smoothly, thanks to able chairing and time-keeping by the following (in chronological order): Dilwyn Griffiths, Richard Norris, David Mitchell, John Benzie, Bob Congdon, Jenny Davis, Lee Benson, Ros St Clair, Rod Buckney, Tim Doeg, Rod Oliver, Maryanne McKaige, Norm Milward and Ian Campbell. For those not attending particular papers, the sitting/drinking/chatting area close by the conference rooms was great for relaxing, meeting people, and exchanging ideas.

The Annual Dinner in the Skipper's Restaurant seemed fairly non-debauched, and the absence of an after-dinner speaker was welcomed by most. With the tight programme of papers, time for heated debate about the relative importance of rock size, leaf litter, kidney stones, and Wimbledon vs Liverpool was at a premium. Some of the (free) wines were novel, including a strange Reiselle and a pleasant claret which removed headaches. The Sunday BBQ at the Bosun's Grill was entertaining, especially when the 'entertainer' gave up trying and left the throng in peace(s). After closing time the all-night cleaning staff (a strange but willing pair) opened the bottle shop (or was it the Cabin Boys' drawers?) to all-night revellers who sampled port, then the pool, followed by the Coral Sea and who knows what else. In future we should perhaps institute the Abandoned Swimsuit prize for excellence in Unknown Activities. Despite all this, the resort manager went to some pains to congratulate the conference delegates on their general easy-going nature and 'good behaviour'. I believe he is used to much less civilised crowds such as medical practitioners and local dignitaries.

Monday was dispersal day. Some were remarkably unlimnological and remained on Magnetic Island. About 20 people took the coach to the rainforest at Paluma (Mt Spec), sampling Devonshire teas en route, and enjoying rapidly passing greenery during sideways slides of the bus. Several groups travelled independently to Paluma and some continued from there to Kirrama and Yuccabine Creek and further north. Much collecting was done, exotic birds were fed out of the hand, some Westerners found that Eastern Promise did not extend to the fish and chips, and Sam Lake lost his plane ticket. Thanks are due to Lee Benson for escorting the coach party, and to Al Bailey for driving the coach, and for dropping people off at all points of the compass.

A final couple of thoughts for future organisers: the venue, including the conference rooms and particularly the immediate environs, are vitally important; 65 papers in two days are the absolute limit - aim at fewer papers, or an extra day or two (but never more than two parallel sessions, please); expect to receive 40%+ of abstracts after the due date, and 5% in the week that the conference starts; and endeavour to avoid the honour of the 'services to proofreading' award.

I must thank fellow organisers Ian Campbell and Margaret Hart, helpers Lee Benson and Paul Clayton, and all contributors and participants. I should also acknowledge the support of the Ok Tedi contingent who payed for (but did not select) the drinks at the Annual Dinner. James Cook University and its Centre for Tropical Freshwater Research were generous in supply of materials and manpower.

ASL CONGRESSES

1989
Canberra

1990
Jabiru

1991
Melbourne?

PRESIDENTS REPORT

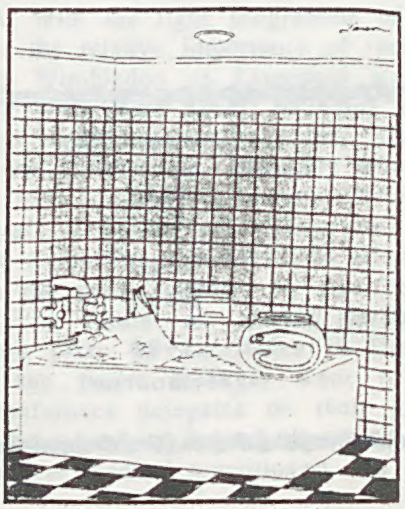
Writing both an Editorial and a Presidents Report may be construed as some form of media monopoly (for which some WA residents are well known already), however I want to establish the latter as a feature that I hope will continue in the Newsletter in following years.

My first task as President is to thank Terry Hillman for his capable and very entertaining presidency in 1987/88 - we plan to publish Terry's Presidential Address from the 27th Congress in the next Newsletter.

Secondly, I suggest that we actively and individually promote ASL by encouraging our limnological colleagues and students who are not members to join up now ! This is particularly important for students who may wish to enter for a Student Travel Award to the next Congress because they will need to have been ASL members for 12 months prior to applying.

Finally, probably because I live in one of the more isolated cities in Australia, I see ASL as now entering a phase of being an active society in various regions throughout the country. To overcome some of the problems that distance involves, we are hoping to hold teleconference Executive meetings. If these are successful (and not too expensive), they should enable us to overcome some of the previous problems of Executive members who could not actually attend meetings other than those held at Congresses. An active participation in ASL on an Australia-wide basis is something that must make the Society more exciting and hopefully may also promote limnology as a revelant and important area of Australian research to support, at a time when good promotion is needed if the research dollar is to be obtained and sustained.

Jenny Davis



Places never to set your electric eel

JOLLY AWARD 1988

Peter Cullen, of the Canberra College of Advanced Education, is the recipient of the 1988 Jolly Award

★ Apologies to George Ganf for the unintentional omission of his name from the list of Jolly Award recipients published in the last Newsletter. George recieved the Jolly Award in 1985.

1988 ASL STUDENT PRIZE

The ASL Award for the best paper presented by a student at the Congress was won by Premek Hamr for his paper entitled "Giant Lobster Tales: The biology of *Astacopsis gouldi* "

Premek is a PhD student in the Zoology Department at the University of Tasmania, supervised by Dr Alistair Richardson.

1988 Student Travel Awards

Three awards of $300 each were made to :

Mr P. Hamr, Zoology Department, University of Tasmania

Ms N. Rea, Botany Department, University of Adelaide

Ms J. Hoey, Warnambool Institute of Advanced Education

for travel to the 1988 ASL Congress

Apology

ASL sincerely apologises for the confusion over the closing date and place to send the 1988 Student Travel Award applications. The correct information had been published in the November and February editions of the Newsletter. We regret that a number of students missed out on Travel Awards because of the discrepancy between the information given in the Newsletters and on the Congress registration form. Little could be done by the time the mistake became evident, but we will do our utmost to ensure that this problem does not occur again.

1989 Student Travel Awards and ASL Membership

Students and supervisors of students please note that from now on applicants for ASL Student Travel Awards must be ASL members for <u>one year</u> before they are eligible to apply for an Award.

So send in your membership application form NOW if you think you may wish to apply for a Travel Award for the 1989 Congress and you are not yet a member of ASL.

Call for Information

Australian Biological Research Group Pty Ltd is undertaking a review of the conservation values of rivers and streams in Victoria for the Land Conservation Council and the Department of Water Resources. In order to do this, we are anxious to collate as much relevant limnological data as we can, so that we can identify streams of limnological significance, streams that are significant for the extent or quality of research undertaken there, streams that are largely undisturbed environments, and streams that are good representatives of their ecological type.

We would be grateful if researchers who have published or unpublished information that is relevant to this project could contact Dr Charles Meredith or Ms Helen Goss at ABRG. All information would be fully acknowledged. In the case of unpublished data we would respect any requests for confidentiality.

Australian Biological Research Group Pty Ltd, PO Box 145, Williamstown Vic. 3016 (03) 397 6399

CALL FOR PYRALIDAE (Aquatic moths)

John Hawking of the MDFRC is currently revising the Pyralidae:Nymphulinae group and is keen to examine larval and adult specimens. The adult revision is being conducted in co-operation with Dr.Ebbe Neilsen, Curator of Lepidoptera, CSIRO Division of Entomolgy, Canberra. People with specimens can contact John on (060)431002 or via MDFRC, PO Box 921, Albury, NSW, 2640.

Not only did Max Finlayson manage to keep all his shirt buttons on Magnetic Island, but he finally discovered how he lost the last set at Hume Weir- he would now like to know how the post barbecue adventures of Doug Holdway and Tim Doeg managed to escape mention.

LETTERS

ASL Congress in Jabiru I

I write in support of Max Finlayson's plea to take up Bob Fry's offer to host an ASL Congress at Jabiru. Ignoring the semantic solecism of "far flung" I do not see Darwin as more distant or expensive than Perth or Townsville, and I live much closer to Macquarie Island than most of you. Much of what Max Finlayson has to say is true. Some congresses have been held in places about as remote as the Kalahari from centres of limnological real estate or activity.

Mainland Australia is so lacking in natural lakelands (salt lakes don't count) that it is indeed difficult to find an appropriate congress venue. So why pass up the very one with a wealth of natural limnological attributes, surrounded by a World Heritage area, the one which has seen money spent on an unprecedented scale on research into the natural aquatic environment, and the one which has repeatedly offered to host the Society. Anyone who has had anything to do with ARRRI knows what that means.

I have nothing against Townsville. In fact, it's much closer than Jabiru to the Normanton-Croydon railway and the Greenvale mixed, but if those of you who are not distracted by such things were to engage in a little comparative timetableology and fare structures you would find a tax-deductable experience of Kakadu further from penury than you imagine. The cost would be on a par with Townsville. So, are you really interested in limnology, or the barrier reef?

Dr P.A.Tyler
University of Tasmania

ASL Congress in Jabiru II

I read with considerable interest Max Finlayson's article in the last issue of the ASL Newsletter. My own view is that the ASL should plan to hold its 1990 Congress in Jabiru. A number of considerations persuade me to this view. Not least is the fact that the north is increasingly beginning (at last) to be recognised as part of Australia limnologically. For too long, our limnology has focussed on the temperate fresh waters of the S.E. and S.W., or saline or temporary waters elsewhere. It's time we began to include in a more determined manner within our bailiwick tropical waters. AWRAC recognised the need to give them more attention when it set up its centre in Townsville. Here is our own chance.

I think Australia has a marvellous opportunity to contribute to limnology by more firmly investigating troical waters than it has. We should accept our responsibility to do so. The importance of tropical limnology was recognised many years ago by those pioneers of our science, Thienemann and Ruttner, when they upped and offed to Indonesia. Somewhat later Thienemann (1959) wrote as follows (translated for monolingual anglophones): "The tropics are the cradle of life. Biological conditions in temperate zones represent something derivative or secondary in comparison to the tropics.... only knowledge of the primordial, tropical conditions can give the scientist a deeper understanding of how life proceeds at our latitudes. That holds for the tropics in general, but also for their inland waters" [p. 129].

Besides, who knows when next such an offer will eventuate. You know how it is with governments: at best they're fickle friends. I think we should seize the opportunity while this government, at least, still thinks it's worth supporting limnology in the north, and while we have friends and allies up there.

W.D. Williams
University of Adelaide

one, two... testing... one, two...
Hey!.. Hey, you! You little bug-eyed greasy sardine! Let me tell you something about your sister!..
Hello, hello... Al, is this thing on?

Testing whether fish have feelings

LETTER FROM AMERICA

Unlike Alistair Cooke, I can't preface my first U.S. communication with urbane banter about the last time I had a game of golf with a President, although I have played marbles with Sally McIntyre and John Melack's son - but I guess that doesn't count.

Anyway, to things limnological. Yes, there is a lot of money in the U.S. and most of it doesn't go into ecology. Around Santa Barbara there are lots of palatial new establishments with anonymous architecture and bland names like "General Systems and Technology Inc."; they probably have something to do with inventing new ways of doing nasty things to Russians or Iranians or maybe Crocodile Dundee - Ah! that we should be so lucky. Since limnology has little role in SDI or gene bending, we get to work in less-than-palatial prefab huts of WWII vintage that shake whenever some blighted chemist turns on the fume hood. However, the water chemists do have some pretty ritzy looking machines, although the microscopes predate Robert Hooke. So not everything is bigger and better or brighter and newer in the USA.

The funding scene here gives me a distinct feeling of deja vu. Because the deficit is so high, Science has to Pay Its Own Way (unless it can be launched against The Evil Empire). So NSF is about to trim some fat.... you know the platitudes by now. The upshot was, for wet people at least, a clear message that research was getting a mite bit bogged down in the particularities of "...ahhh, but in my lake/stream..."; things have to be more generalisable, more exciting, more novel, more interdisciplinary. Perhaps not altogether a bad thing either, given that the information content at the SPU (Smallest Publishable Unit) has declined rather dramatically in recent years.

On the positive side, however, they do talk science here. People are interested in what they do, they go to seminars, and they even listen. I suppose UCSB is rather an exceptional place; I got to talk more ecology in my first four weeks here than I've heard at all the ASL and ESA conferences put together. Consequently, this is a very exciting place to work; I wish I'd thought of doing this earlier.

Finally, although most $$'s go into stupid things like SDI, there are still rather more limnodollars here than I'm used to seeing. The latest rage (watch out, Richard P. and ARRRRRRRRI) is TROPICAL LIMNOLOGY. NSF is building a big new general ecological lab in Costa Rica and Stroud water center is also building a palatial tropical

lab elsewhere in Costa Rica that literally has more facilities than all of the AWRAC centres put together - well, at least for biological things anyway. Meanwhile, I'll just count chironomids and microcrustacea (ugh!) from a lake I haven't seen yet.

Leon Barmuta

Biological Sciences, UCSB,Biosphere Reserves and World Heritage Sites - Freshwater Systems

Professor Bill Willaims, who is a member of the SIL Committee for the conservation of inland aquatic sites, has communicated the following information regarding aquatic sites of interest -

"Recently SIL was approached by UNESCO with a request to provide proposals in the following areas:

1. Proposals on which freshwater systems should be covered by Biosphere Reserves and World Heritage Sites?
2. Which principal problems should be covered by research in the Biosphere Reserves?"

Bill suggests that ASL members who wish to nominate sites of interest or specific research problems should contact the Chairman of the SIL Committee directly, Dr Nevill Morgan, Les Echeties, Thiefosse, 88290 Saulxures-sur-Moselotte, France.

★ The longest word in the world, with 29 letters, is

FLOCCINAUCINIHILIPILIFICATION

which means the art of estimating something as worthless. How appropriate.

STATE and TERRITORY AFFAIRS

In this Newsletter the good news comes from Victoria, the NT, and NSW. The members of the new Executive are now responsible for gathering news and views across the nation for 1988/89. Please contact your local Executive member before each deadline with your contribution. The address and phone number of each correspondent is given on the inside back cover. In addition Ros St Clair has consented to be our correspondent for north Queensland, her address is :

Ros St Clair
Zoology Department,
James Cook University,
Townesville, Queensland, 4811.
(077) 814 310

Thanks to all our correspondents in 1987/88, and to all the people who contributed, you did a great job in getting this section of the Newsletter off to a flying start.

Victoria

Correspondent: Richard Marchant, Museum of Victoria,
71 Victoria Crescent, Abbotsford, Vic. 3067.

The impression was given in the last newsletter that not much limnology seemed to be happening in Victoria and that the Bicentennial celebrations had taken all our attention. Well that just shows how wrong you can be.

The Acheron team (Tim Doeg, Sam Lake, Richard Marchant) have done their bit to celebrate European arrival in Australia by continuing to destroy (or disturb in ecological parlance) their creek. Over the last summer they were ably assisted by two summer students: Mike Douglas from Zoology, Monash, and Glen Collins from Zoology, Uni. of W.A. This project will continue for another year (unless they run out of creek).

In the LaTrobe Valley Bruce Chessman and Dave Robinson are continuing with various projects. Both now work for the Victorian EPA rather than the LaTrobe Valley Water and Sewerage Board and have recently moved into new laboratories on the outskirts of Traralgon. Dave has been busy with (amongst other things) long-term monitoring of the lower LaTrobe River. Since 1981, each summer he has resampled three of the sites used by the Museum of Victoria in their study in the early 1980s. Bruce is running an

AWRAC project which is experimentally assessing the effects of nutrient limitation on diatom communities and invertebrates in streams. He has developed a highly sophisticated experimental technique that uses flowerpots (there could be a sunrise industry here). Bruce and Richard Marchant have recently received an AWRAC grant to develop a biological classification of Victorian rivers based on invertebrate communities. This will keep them number crunching for a couple of years. Jocelyne Hughes, who finished her PhD on Tasmanian stream macrophytes last year, has joined the Geography Department of the University of Melbourne as a lecturer. She will be collaborating with Prof. Tom McMahon's group in their AWRAC funded Centre for Environmental Hydrology.

To end this communication is a poem by the Museum of Victoria's current Science and Humanities Scholar, Mark O'Connor, who came to watch stream destruction in progress.

WADING AT ACHERON CREEK

Museum expedition with Richard Marchant and Tim Doeg
25/3/87

To invade this brown turf of may-fly and caddis-worm
where the web-spinning larvae, too delicate
to live in vertical gravity,
recline in languorous undulations
I pull on my waders, like spacesuit leggings.
They cling, vacuum-sealed, to skin and shin.
I walk into the brown splashing plain,
the light reptilian hide goose-stepping round my thighs.

The river feels buoyant, dry
as it might to a tortoise
having no heat to lose.

Star-pickets fixed in the stream
are the stairs by which we climb
this field of permanent, passing glitter.

A rock rolls underfoot, as sideways
gravity flicks the blackfly larvae away,
sideways not down. The pull
is to ocean. Stumbling on stones, I startle
at a dry brown trout levitating in its Zero-G,
yet stay upright, dry, and fetch up against a log
that bears flowers of glittering bow-wave.

"Your first time, wading?", they ask.

Northern Territory

Correspondent: Max Finlayson, ARRRI, Jabiru East, NT, 5796.

Biological Monitoring (ARRRI) - Fish Studies.

Keith Bishop, our man with gills, returned to Jabiru in January. He was soon stationed by Magela Creek counting fish migrating upstream towards deep pools within the Arnhem Land escarpment. Quantification of these migrations is providing valuable baseline information on fish recruitment from billabongs downstream of the Ranger Mine during the wet season. So far, daily migration data are available for four wet seasons - the nature of year-to-year patterns are now starting to become discernible. Tieing in with this work, laboratory-based swimming endurance and avoidance tests with various dilutions of mine waste waters are planned for this dry season.

Studies aiming to characterise fish community structures within Magela Creek tributaries and billabongs are still running and have been for sometime now. One study, focusing on a tributary (Gulungul Creek) running past the Ranger tailings dam, is now at a stage where year-to-year patterns are readily discernible - with eight years of monthly community data from ten sites. Keith has a lot of number crunching and writing ahead of him. Other fish studies underway are the characterisation of fish community structures in the Upper South Alligator River, near Coronation Hill, and the determination of metal concentrations in various tissues from fish collected on the Magela floodplain.

More Fishes

A report of the intrepid adventures of David Walden (ARRRI) and Sean Sexton (ANSTO) from the wild, unexplored regions of the ARR.

Yet another species has been added to the already impressive list of freshwater fishes in the Alligator Rivers Region N.T. The Coal Grunter, *Hephaestus carbo*, was recently discovered in an escarpment stream between Jim Jim Falls and Twin Falls. An underwater survey indicated that there may be fewer than one hundred individuals of this species in the area. The Coal Grunter has previously been found in the Cape York and Gulf of Carpentaria drainages, and until now was only known as far west as the Goyder River in Eastern Arnhem Land.

To make the story complete it has to be pointed out that these young gentlemen rode their mountain bicycles some 60 km to reach this particular spot and came out courtesy of a Park Ranger's vehicle as the said bicycles had been severely damaged (like stuffed) inadvertently by a fire. They were on bicycle as the road (track) was still closed due to wet season flooding and erosion concerns.

New South Wales

Correspondent: Rod Oliver, MDRFC, PO Box 921, Albury, NSW, 2640.

To allay malicious rumors that one of the NSW correspondents (RO) is unable to extract news items using the standard thumbscrew technique, the following epistle has been compiled from local sources.

The Director of the Murray Darling Freshwater Research Centre, Dr. David Mitchell, has recently returned from a three week sojourn to Thailand where he was purportedly acting as a consultant for Redecon Australia. This group is providing advise on the ecological impact of a salinity barrier on the Songkhla Lakes. The trip was so enjoyable that David is returning to Thailand for another two weeks in mid-April to present the report with other team members.

Dr. John Brittain from the University of Oslo, Norway, is spending his sabbatical leave at the Murray Darling Freshwater Research Centre (MDFRC) in Albury. He is studying the effects of irrigation releases from Lake Dartmouth on macro-invertebrate life cycles in the Mitta Mitta River. The project, financed by AWRAC, will run until the end of 1988. John is also getting to know Australian mayflies and stoneflies and doing some egg development studies.

Dr. Kevin Rogers, on sabbatical leave from Wits University ,South Africa has been based at the Griffith Laboratory of CSIRO's, Division of Water Resources since August. He is working with Peter Breen and Alan Chick on wastewater treatment by artificial wetlands but his general research interest is in wetland ecosystems. Previous studies have included work on the Pongolo River floodplain looking at the role of submerged macrophytes in ecosystem structure and functioning, and also investigations of plant community succession in the peat bogs of the Okavango Delta.

The MDFRC has been lucky enough to arrange for Dr.Milan Straskraba to visit Australia from the 13th April for a period of about three months. Dr.Straskraba is Director of the Centre of Mathematics of the Czechoslovakian Academy of Science in Ceskebudejovice. He is well known throughout the world for his work on mathematical modelling of reservoir processes. His current research interests include the modelling and management of eutrophication. The centre is organising for him to attend the ASL conference in Townsville as well as other institutions in Australia willing to assist with internal travel costs. The itinerary presently includes Perth, Adelaide, Melbourne, Latrobe Valley and Sydney. If interested in taking advantage of this opportunity contact MDFRC.

Prof.Claude.E.Boyd from Auburn University, Alabama will be arriving in Australia on 1st May and staying for about five weeks. He is Professor of Fisheries and Allied Aquacultures and is a water chemist working on biological processes affecting water quality in aqua- and mariculture industries. Dr.Graham Skyring of the Canberra Laboratory of CSIRO's Division of Water Resources is arranging the visit. Prof.Boyd will be attending the Australian Microbiological Conference and visiting the MDFRC during his stay.

There are rumors, eminating largely from that well known SA gossiper, Lance "The Mouth" Lloyd, that Russell Shiel has moved to Albury. People at MDFRC have in fact reported hearing guitar music coming from one of the new offices late at night, but few can claim to have actually seen the elusive source. In fact my informants have told me that Russ is now actually a resident of the Mallee section of the Ouyen Highway where he is frequently seen in full flight.

ABSTRACTS

DIET OF MOSQUITOFISH AND RAINBOWFISH IN BRISBANE STREAMS

Angela Arthington, Griffith University, Queensland.

Gambusia affinis and Melanotaenia duboulayi prefer similar types of habitat but have an inverse abundance relationship in Brisbane streams. Habitat disturbance, predation, aggression and interspecific competition may explain the decline of the rainbowfish where the mosquitofish is abundant. This paper compares the diets of the two species where they occur together in the same habitats and the diet of the rainbowfish in the absence of G. affinis. Diets are described in terms of their taxonomic composition, the proportions of aquatic and terrestrial food items consumed, and the size of whole prey items in relation to fish size, fish mouth gape and the availability of prey in the environment. These analyses do not conclusively demonstrate predation or interspecific competition for food but do suggest several hypotheses warranting experimental study.

HERBIVOROUS AQUATIC INSECTS IN AUSTRALIA: ARE THEY IMPORTANT IN FRESHWATER COMMUNITIES?

Joe Balciunas - Uni. of Florida (C/- Zool. Dept, James Cook Uni.)

Insects which feed on aquatic macrophytes are usually under-represented in general collections of aquatic fauna and their impact on the composition and abundance of aquatic vegetation is under-estimated and generally unappreciated. Many aquatic plants, once they "escape" the insect herbivores which attack them - as in the case of aquarium plants becoming established in a new country - exhibit rapid and aggressive population growth, unlike that in their native country. The insects which feed on Australia's freshwater plants are fairly diverse and can be found in most communities with reasonable amounts of aquatic vegetation. The moths, especially in the subfamily Nymphulinae, are represented by many species and can be readily collected. These, along with weevils and other aquatic plant herbivores, are illustrated with comments on their hosts and life histories.

Title: What makes Booligal Swamp a Wetland? M.A.W. Bennett, K. Dwyer and P.D. Wettin - Department of Water Resources, N.S.W.

The seemingly simple question of the title is deliberately rhetorical but it is also useful in stimulating consideration of the complexities of the answer.

Booligal Swamp achieved some notoriety in the N.S.W. press a few years back when its "drainage" resulted in the deaths of large numbers of waterbirds. The incident led not only studies by the D.W.R. of the "drainage" and wetland nature of Booligal Swamp but also of the nature of other wetlands of the Lachlan Valley.

Freshets in the Lachlan River in 1986 have permitted more detailed investigations of Booligal Swamp's hydrology and hydraulics. These results are discussed with particular emphasis on the area's water management capability.

Phenology of predation affects the composition of larval anuran communities.

Ross A. Alford, Department of Zoology, James Cook University, Townsville, Qld 4811.

Adult broken-striped newts, *Notophthalmus viridescens dorsalis* are a major predator of anuran larvae in temporary ponds in North Carolina, USA. Densities of adult newts measured in a temporary pond showed seasonal fluctuations, peaking during the winter months and declining to low levels in summer. The timing of the peak and decline in newt density varies between years. A prey community consisting of four species of anuran larvae was established at two densities in an array of 24 experimental ponds. The effects of four predator phenologies (always absent, removed day 9, removed day 51, always present) on the prey community were evaluated. In the absence of predators one anuran was competitively dominant. Addition of predators and alterations in predator phenology changed the competitive interactions among anurans and the species compostiion of the anuran metamorph assemblage. These changes were as predicted by an hypothesis of size-limited vulnerability to predation.

DEVELOPMENT OF TESTS FOR ASSESSING THE EFFECTS OF AQUEOUS WASTES FROM A URANIUM MINE USING INVERTEBRATES, WITH SPECIAL REFERENCE TO HYDRA

Helen E. Allison and Douglas A. Holdway, Alligator Rivers Region Research Institute, Office of the Supervising Scientist, Jabiru, N.T. 5796

Studies have been carried out at the ARRRI on the use of local freshwater invertebrates in testing the toxicity of aqueous mine wastes. Data are required from more than one species and six have so far been selected (two each of Mollusca, Crustacea, Cnidaria). Environmentally relevant test methods for these have been developed. Because operational control of waste release ideally requires 'quick' answers, and because reproduction constitutes a critical and sensitive process in animals, attention in selection of species has been directed in part to those species having short (i.e. < 1 week) generation times. As an example, a sensitive test has been developed using cnidarians, a group that has received little attention in toxicology. Hydra sp. 'A' and 'B' showed significant reductions in asexual reproduction rate when exposed for 6 days to a solution of uranium sulphate (a metal of local concern) at concentrations $\geq$ 160 $\mu g.L^{-1}$. Also, a predictive response was found between effects of the solution on polyp morphology within 4-h and the 6-d asexual reproduction rate. Both species showed marked reductions in asexual reproduction rates (without earlier predictive response) when exposed to one of the mine waste waters at concentrations $\geq$ 32%. Data obtained in this way would be used to determine minimum dilution requirements should approval for waste release be given.

BIRTHDAY CREEK - A CATCHMENT STUDY OF A TROPICAL RAINFOREST STREAM

Lee J Benson, Zoology Department, James Cook University.

The upper Birthday Creek catchment covers approximately 35 hectares of rainforest which was selectively logged by Queensland Forestry 25 years ago and is now included within the area nominated for World Heritage listing. The area is currently the site of several integrated research projects by staff and postgraduate students from the School of Biological Sciences, James Cook University. Research proposals currently under consideration by ARC and AWRAC aim to expand these projects and eventually produce a detailed description of nutrient and organic matter cycling within the system.

THE GENETIC STRUCTURE OF DAPHINA POPULATIONS.

John A.H. Benzie, Australian Institute of Marine Science,
PMB No. 3, Townsville, Qld. 4810

The geographical patterns of allozyme variation in Australian Daphnia species are described and the role environmental and stochastic influences play in determining this pattern is discussed. These findings are briefly compared with descriptions of the population structure of other Daphnia species worldwide. The Australia data have important implications for the general way in which Daphnia population structures have been regarded in the past.

IMPACT OF SEWAGE EFFLUENT AND URBAN DRAINAGE ON THE ECOLOGY OF MCLEODS MORASS, BAIRNSDALE.

H.Bibrowska, EPA Melbourne & D.Robinson, EPA Traralgon.

A study was undertaken on Mcleods Morass a deep freshwater wetland of medium size Bairnsdale, Victoria.
The aim of the study was to make a preliminary assessment of the discharge from the Bairnsdale sewage treatment plant and runoff from nearby urban and landfill areas on water quality and selected biota of Mcleods Morass. The wetland receives very high waste loading from the treatment plant. The nutrients, SS and BOD values were very high near the effluent discharge and decreased with a distance. The total number of invertebrate taxa collected was low. Chironomids and oligochaetes were the most abundant taxa at all sites, patricularly near the effluent discharge where species richness was the lowest. The long term waste loading (approximately 20 years) may have had a permanent effect on invertebrates community decreasing both the species richness and eveness. The results of this study indicate the need to establish water quality objectives - chemical and biological- for management of wetlands.

MORPHOLOGICAL DIFFERENTIATION BETWEEN POPULATIONS OF *OREOCHROMIS MOSSAMBICUS*

David R. Blühdorn, K. John Delaney and Angela H. Arthington
Division of Australian Environmental Studies, Griffith University, Nathan, Queensland.

Four Queensland populations of the introduced cichlid, *Oroechromis mossambicus* , were sampled for morphometric analysis. A number of standard morphological measurements were taken and the resulting data subjected to multivariate statistical analysis. Four factors, the proportion of head to standard length (%SLH); interorbital width to head length (%HIO); snout length to head length (%HSn); and caudal peduncle length to width (%Cp!Cpd), were found to contribute 90% of the overall variation between populations. These factors were then analysed using univariate statistical methods which indicated the differences between populations and sex attributable to each factor. These morphometric differences are used to characterise the populations and may be related to environmental differences such as habitat and climate. Gonosomatic index (GSI) values were also calculated and used to indicate differences between one of the populations and the remainder. This index is used as an indicator of "stunting" which may be attributable to precocious breeding or environmental limitation. Future studies of these populations will determine if these characteristics are usable as indicators of morphological divergence due to habitat.

DO TERRESTRIALLY-EXPOSED LEAVES DECOMPOSE FASTER THAN SUBMERGED LEAVES?

A.J. Boulton, Department of Zoology, University of Adelaide.

Felix Bärlocher and his coworkers found that the protein content of decaying detritus on the dry bed of a temporary pool in Canada exceeded that of litter submerged in nearby permanent pools. The increase in protein was attributed to microbial colonization which enhanced the palatability of the litter to aquatic macroinvertebrates invading the pool when it filled.

This did not hold true for eucalypt leaf packs in an intermittent stream in Victoria. Microbial biomass (as ATP) on submerged leaves steadily increased with time whereas terrestrially-exposed litter remained relatively sterile. Densities of most functional feeding groups on submerged leaves increased over time; scrapers, rather than shredders appeared to be instrumental in leaf decomposition.

THE OPTICAL PROPERTIES, PHYTOPLANKTON, AND NUTRIENTS OF S.E. QUEENSLAND FRESHWATER DUNE LAKES

L.C. Bowling, Botany Department, University of New England

Measurements were made on 26 lakes from North Stradbroke, Moreton, and Fraser Islands, and the Cooloola Sand Mass. Dissolved humic substances (gilvin) contributed most to the extinction of underwater Photosynthetically - Available Radiation, while phytoplankton (assessed by chlorophyll a content) and turbidity were insufficient attenuators in most instances. Mean downwelling attenuation coefficients (Kd(av)) ranged from $0.19m^{-1}$ in clearwater Lake McKenzie to $4.91m^{-1}$ in highly dystrophic Red Lagoon. Irradiance reflectance and scattering coefficients could only be calculated for a few of the lakes, and were generally higher than anticipated from non-turbid waters. Most lakes were oligotrophic, with low levels of both total nitrogen and total phosphorus. Desmids and Peridinium spp. dominated the phytoplankton, although Dynobryon cylindrium Imhof., and various Chlorococcales, were also common.

ARTIFICIAL WETLAND WASTEWATER TREATMENT: FACTORS AFFECTING THE NUTRIENT REMOVAL PERFORMANCE OF EXPERIMENTAL UPFLOW SYSTEMS

Breen, P.F. and Chick, A.J. CSIRO, Griffith.

The performance of experimental artificial wetlands for wastewater treatment was examined under a range of environmental and operational conditions. Performance was assessed with respect to system age, season (temperature), harvesting requirements, loading method, and plant growth phase. For the range of conditions considered the performance was consistently good with respect to percent load removals for total nitrogen and total phosphorus >90%, and chemical oxygen demand >80%. The results indicate that, within certain design criteria, a number of application and management options appear to exist for utilizing artificial wetlands for wastewater treatment.

ARE AUSTRALIAN MAYFLIES AND STONEFLIES REALLY DIFFERENT?

John E. Brittain, MDFRC, P.O. Box 921, Albury NSW 2640

In connection with assessing the effects of dams on macroinvertebrate life cycles, quantitative studies of egg development in Australian mayflies (Ephemeroptera) and stoneflies (Plecoptera) are being undertaken. Eggs are reared in the laboratory at constant temperatures ranging from 5°C to 30°C. For several species from a range of families there is a clear relationship, linear on logarithmic scales, between water temperature and the length of the egg incubation period. These relationships do not differ from those displayed by northern heimisphere species. Diapause and delayed hatching, present in certain northern hemisphere species, also occur in some Australian species. At least with regard to egg development, it would appear that Australian mayflies are not that different from their northern cousins.

STABLE ISOTOPE ANALYSIS OF CARBON FLOW IN A TUNDRA RIVER SYSTEM

Stuart Bunn, Division of Australian Environmental Studies, Griffith University, Brisbane

Stable isotope analysis was used to identify the major sources of carbon utilized by fish and aquatic invertebrates in a tundra river system in northern Quebec, Canada. Despite the obvious lack of riparian vegetation, allochthonous material was the major food resource used by fish and invertebrates in the small tributaries and rapids of the river channel. However, $\delta^{13}C$ values of fish and invertebrates in Alik Lake, a deep river basin, indicated that a different source of energy was driving this part of the river system. Further studies are proposed to determine the source of this energy.

THE COMMUNITY STRUCTURE OF FISHES IN LAKE BURRINJUCK, NSW, WITH REFERENCE TO THE RECENT REDFIN INTRODUCTIONS

J J Burchmore*, S C Battaglene** and A C Roach*
*Fisheries Research Institute, P O Box 21, Cronulla, NSW, 2230
**Brackish Water Fish Culture Research Station, C/- P O Salamander Bay, NSW, 2301

Lake Burrinjuck on the Yass, Murrumbidgee and Goodradigbee Rivers, has long been considered one of the most popular freshwater angling locations in NSW. It contains an unusual and unique mixture of cold and warmwater fishes, both introduced and native. Since 1985 surveys of the impoundment have been assessing the biology of native and introduced fish species; the success of salmonid stockings; the effect of introduced species on native species and the status and characteristics of the amateur angling fishery. Preliminary community structure analysis has shown that the riverine sites (with lower species diversity) are clearly distinguished from the main basin sites. Since 1986 redfin have gradually been moving down the Murrumbidgee Arm of the dam and the implications of this introduction are discussed.

EXPERIENCES OF A WATER SUPPLY ENGINEER WITH ALGAE

Frank L Burns, Consulting Engineer, Glen Waverley, Vic.

To many water supply engineers algae are Unidentified Floating Objects, (UFO), suddenly appearing in their reservoirs to create maximum chaos and then disappearing just as suddenly for no obvious reason. The 'knee-jerk' reaction when they appear has been to reach for the copper sulphate, with little if any thought being given to the biological effects of this costly 'sledge-hammer' approach, or the possibility that it might even be worsening the situation.

In recent years however water supply engineers have realised that biologists as well as chemists should be involved in water quality monitoring and management, and a more enlightened approach is being taken to algal control.

There is more interest in identification of species, and studying their varying habits and influences on water quality, and this knowledge is being used to modify reservoir design and operation, with considerable cost savings.

The paper presents the experiences of one such engineer.

AN INTERCONTINENTAL COMPARISON OF LEAF DECOMPOSITION IN UPLAND STREAMS

Ian C Campbell, Centre for Stream Ecology, Chisholm Institute of Technology.

Kenneth W Cummins, Appalachian Environmental Laboratory, University of Maryland.

Packs of leaves of Ulmus sp. (Elm), Rhododendron Eucalyptus nitens and Atherosperma moschatum (Sassafras) have been placed in streams in East Gippsland (Victoria) and Maryland (U.S.A.) to compare decomposition rates of exotic vs local vegetation. Preliminary results indicate that decomposition rate is more dependant on leaf species than on locality of the stream. Ongoing studies will examine shredder densities on packs on the two continents, and the inputs of litter into Australian streams.

ENVIRONMENTAL STUDY OF BJELKE-PETERSEN DAM

Diane Conrick, Brian Bycroft and Angela Arthington,
Division of Australian Environmental Studies, Griffith University, Brisbane

The Bjelke-Petersen Dam will supplement town water services to Murgon and Wondai and supply irrigation water to farmers adjacent to Barambah Creek in the South Burnett region of Queensland. It will also provide a major recreational fishing site in the Wide Bay region. An environmental study is underway to provide a before and after analysis of water quality, macroinvertebrates and fish. The study of fish will emphasis their distribution, abundance, habitat, flow requirements and the likely effect building of the dam will have on their survival. This study is designed to assist the Queensland Water Resources Commission in managing the dam taking heed of the needs of the fish as well as the farmers. The project will be outlined and results to date will be discussed.

MONITORING THE MURRAY

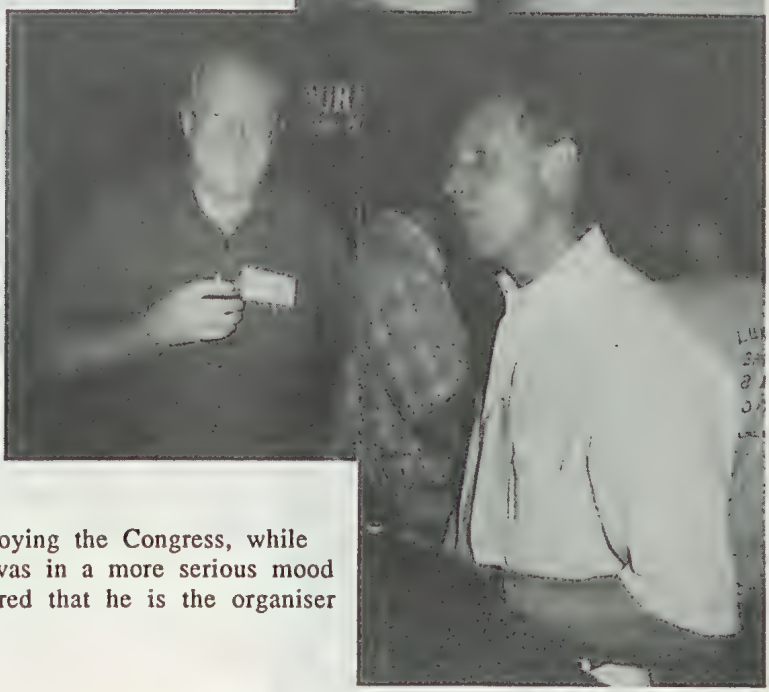
Roger Croome, Rural Water Commission of Victoria.

Three major reports are about to be published by the Murray-Darling Basin Commission, one reviewing the water quality monitoring of the River Murray and selected tributaries for the period 1978-1986, a second presenting the results of macroinvertebrate monitoring for the period 1980-1985, and a third discussing the phytoplankton of the system for the period 1980-1985. The major findings of the reports are discussed, and recommendations for future monitoring presented.

The retiring (reclining) President, Terry Hillman

Right - The out-going Executive from L to R, Andrew Boulton, Ian Campbell, Richard Pearson, Rod Oliver, Richard Norris, Jenny Davis, Max Finlayson, Margaret Hart, and Terry Hillman.

(We forgot to photograph the incoming Executive)



David Mitchell was enjoying the Congress, while Richard Norris (right) was in a more serious mood - he had just remembered that he is the organiser of the 1989 Congress.

A happy bunch

2nd left - Rod Buckney expounds the delights of kiwifruit wine.

2nd right - Alena found an elmid that big ?

3rd left - Vince, Ros, Peter and Dave enjoyed the kiwifruit wine too.

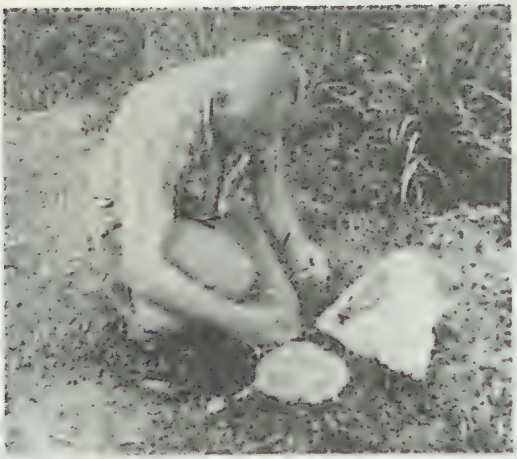
Ross Smith, runner-up for the David M. Scienceperson Door Prize Award for services to shrimp tagging.

Was the food really so bad that Richard Tilzey had to eat his menu?

Is that so, Max?

Ian Campbell demonstrating his newly acquired north Queensland skill of beer inhaling

Waiter, cleaner and port supplier extraodinaire



Frank Burns collecting copepods at Little Crystal Creek

Premek Hamr (Student Prize winner) discussing the biology of *Sandshoe sp.* with Andrew Boulton.

Vince Pettigrove wrapping rocks at Birthday Creek, or the 102 nd use for Gladwrap™

AN ECOLOGICALLY USEFUL CLASSIFICATION OF MEAN AND NEAR-BED FLOWS IN STREAMS AND RIVERS

J. A. DAVIS AND L. A. BARMUTA,
SCHOOL OF BIOLOGICAL AND ENVIRONMENTAL SCIENCES,
MURDOCH UNIVERSITY, MURDOCH, W. A., 6150.

Mean and near-bed flows in streams and rivers can be described using a classification derived from fairly simple field measurements. Our classification is ecologically useful because it incorporates the combined effects of velocity, depth and substrate roughness to provide a means of quantifying the flow regimes occurring within the microhabitats of stream benthos.

Conventional stream sampling methods may collect across several different flow microhabitats; this classification enables different flow microenvironments to be recognised and so sampled more appropriately, which, in turn, may reduce apparent clumping and the wide confidence intervals of benthic population estimates. Because our classification identifies "patches" within the flow regime associated with the stream bed it will also enable stream ecologists to generate testable hypotheses regarding the distribution and abundance of benthic species in response to flow.

STRATEGIES FOR THE BIOLOGICAL ASSESSMENT OF WATER QUALITY USING THE MACROINVERTEBRATE COMMUNITIES OF NATURAL AND ARTIFICIAL SUBSTRATES.

Peter Dostine, Alligator Rivers Region Research Institute, Office of the Supervising Scientist, Jabiru, N.T. 5796

A biological surveillance programme is being carried out by the ARRRI as part of the process of validation of the environmental acceptability of dilution standards (based on pre-release toxicity testing) for discharges of mine waste waters to the Magela Creek. Techniques are being devised to detect and quantify the effects (acute and chronic) of these wastes upon organisms and communities. Amongst methods currently being evaluated is the use of both natural and artificial substrates to sample macroinvertebrate communities and provide base-line information in the temporary reach of Magela Creek from above Ranger Uranium Mine outfall to Mudginberri Billabong. This information will provide a basis for detection of any adverse waste impact and determination of its extent in the short to long term. Data from the recent 1987/88 Wet season are presented, describing seasonal and spatial variation within and between the macroinvertebrate communities colonising natural and artificial substrates. Analyses indicate that gravel basket type artificial substrates contain a diverse assemblage of organisms from early in the Wet season and may provide rapid feedback on the effects of mine waste waters; however, sampling of macroinvertebrate communities from natural substrates during the Wet/Dry season transition provides the most appropriate strategy for long term environmental protection.

A STUDY TO ASSESS THE DISTRIBUTION AND FATE OF MINE RELATED DISCHARGES IN THE FLY RIVER SYSTEM - PAPUA NEW GUINEA.

A.M. Eagle, Ok Tedi Mining Limited, P O Box 1, Tabubil, Papua New Guinea.

A large scale gold and copper mine located in the upper Ok Tedi catchment, a tributary of the Fly, began operation in May 1984. Discharges from the mining operation; process residues and overburden, enter the river system at a current rate approaching 100,000 tonnes per day.

A comprehensive environmental study was commenced in July 1986 to determine the potential impact of these inputs in the Fly River system and estuary. Due for completion in December 1988, the study findings will be used to establish an acceptable particulate level for the River. This criteria will be used by the operators of the mine, to determine ore residue and overburden retention facilities necessary for the remainder of the mine life.

The rationale, programme and progress findings of the study including dilution of mining inputs by natural sediment loads and the capacity of this major river system to assimilate imposed loads are discussed.

ROBUST ORDINATION AND SIGNIFICANCE TESTING: A STUDY OF THE FUNCTIONAL FEEDING GROUPS OF THE UPPER LATROBE RIVER

D.P. FAITH, CSIRO, Division of Wildlife and Ecology, P.O.Box 84, Gungahlin, A.C.T., 2602

Multivariate analysis of freshwater survey data must satisfy a number of requirements if it is to be useful for biological monitoring and management:

1) The methods must make robust assumptions about the relationship between the data and the underlying pattern.

2) Evaluation of a potential pattern's explanation of the data should precede further interpretation of the pattern

3) At both the explanation and interpretation stages, there is a need for methods of significance testing that are tied to our robust data-to-pattern assumptions.

I highlight these requirements in an analysis of a subset of the Museum of Victoria macro invertebrate data from the upper LaTrobe River. A robust ordination method, HMDS (Faith, Minchin, and Belbin, Vegetatio,1987) provides a 2-dimensional explanation of species abundance variation and reveals patterns in functional feeding groups that are tested against null hypotheses.

EVALUATIONS OF A NATURAL WATER CLARIFICATION SYSTEM

P.D. Farrell, Botany Department, James Cook University of North Queensland.

A natural water clarification system established at Mt. Isa has been shown to be 98% efficient in trapping suspended solids from the incoming waters. Investigations into the mechanisms of the system reveal that this water clarification is attributable to: design features which restrict high turbidities in the incoming waters, physical conditions that limit the magnitude of wind generated currents capable of causing erosion and resuspension and the presence of dense stands of aquatic macrophytes which further retard water velocities, provide catchment surfaces for suspended solids and bind loose sediments.

BIOLOGICAL ASPECTS OF LIMNOLOGICAL RESEARCH IN TROPICAL AUSTRALIA

Max Finlayson, ARRRI.

Until the establishment of the Australian Centre for Tropical Freshwater Research tropical bio-limnological research in Australia was primarily undertaken by researchers associated with JCUNQ and ARRRI. Much of this research was problem oriented and financed by private enterprise either directly or indirectly. Some of the most extensive studies have been undertaken at ARRRI in response to perceived environmental problems related to uranium mining.

The biological features of tropical island waters are often assumed to parallel that of the moist terrestrial forests. In the case of species diversity this is often not the case, though inadequate data bases make such comparisons difficult. Using the seasonably inundated floodplains (e.g. the Magela) as an example the concept and role of natural disturbance in species succession is described as a prelude to debunking the concept that these ecosystems are fragile and therefore (for that reason) need protecting. Rather the ecosystems are resilient and dynamic and well able to withstand the current patterns of natural disturbance.

Despite low nutrient concentrations the floodplain ecosystems support a large biomass of animals and plants. In terms of the maintenance of high biomass under these conditions it may be worthwhile to treat the ecosystem as a chemostat i.e. the rate of supply rather than the concentration of a limiting nutrient is important. The concept of nutrient limitations on biomass and productivity in unstable ecosystems (i.e. ecosystems that experience frequent disturbance) is further considered in view of hot temperatures limiting primary production.

Finally, after considering the dynamic and resilient nature of these ecosystems their ability to withstand two relatively new disturbances - weed invasion and pollution - is briefly discussed.

THE EFFECT OF LIGHT INTENSITY AND TEMPERATURE ON MICROALGAL PIGMENTS.

Dianne Flett, Warrnambool Institute of Advanced Education

The microalgal photosynthetic pigments present in a water sample are used to estimate plant biomass, primary productivity, algal physiological state, and algal speciation. The reliability of these estimations depends on the pigments being sound ecological indicators. This paper will present results from a preliminary study assessing the effect of light intensity and temperature on the pigments of seven species of freshwater and marine microalgae grown in the laboratory. Variations in the major chlorophyll and carotenoid pigments as determined by HPLC will be discussed.

"GIANT LOBSTER TALES: THE BIOLOGY OF ASTACOPSIS GOULDI."

Premek Hamr, Zoology Dept. University of Tasmania
G.P.O. BOX 252C, HOBART, TASMANIA. 7001

The giant freshwater lobster of the north coast of Tasmania is the world's largest freshwater invertebrate, reaching weights of up to 4 kg and body lengths of 60 cm. It has a relatively restricted distribution but is exploited in a recreational fishery. It has been listed as "vulnerable" in the IUCN Invertebrate Red Data Book and is the subject of regular enquiries from aquaculturalists.

The reproductive biology and growth of this poorly understood species have been studied in the field over a period of two years. Data on growth, seasonal reproduction, population structure and density were obtained through a mark recapture program. Size at maturity and reproductive condition were determined by changes in reproductive morphology and gonad condition.

A. gouldi is capable of reaching very large size during its potentially long life span. Maturity is reached late and at relatively large size especially in the female. Upon reaching maturity females exhibit a biennial breeding and molting cycle typical of other Tasmanian parastacids.

The effect of the recreational fishery was noted in the study population and compared to several other populations where fishing pressure varied from very high to negligible.

FUTURE LIMNOLOGICAL RESEARCH AT THE FISHERIES RESEARCH INSTITUTE, NSW

J H Harris
Fisheries Research Institute, Dept. Agriculture NSW, P O Box 21, Cronulla. 2230

Rapid changes in issues surrounding the management of freshwater resources in New South Wales have prompted a thorough review of limnological research at the Fisheries Research Institute. The review has commenced within three constraints: research must be relevant to fisheries management and conservation issues, it must be directed primarily towards commercially or recreationally important species, and it must promote the Institute as a centre of excellence.

Research has initially been classified into that for environmental protection, biological studies, and research to facilitate fisheries management decisions. These needs will be discussed and comments invited.

CHEMICAL LIMNOLOGY IN THE TROPICS

Barry T Hart, Centre for Stream Ecology, Chisholm Institute of Technology, Caulfield East, 3145

The tropical region of the earth, generally considered to extend from approximately latitudes 23° south to 23° north, is characterised by:

(a) high annual irradiance leading to generally high temperatures;

(b) low variations in this irradiance resulting in small variations in temperatures;

(c) high annual precipitation and evaporation rates, with an excess of precipitation over evaporation over the continential areas;

(d) a normally highly seasonal rainfall, often with a distinct wet and dry season;

These conditions lead to some distinctive features in tropical aquatic systems compared to those in temperate regions.

This paper will discuss the chemistry of tropical limnological systems, with particular emphasis on studies carried out over recent years in the Alligator Rivers Region of northern Australia. Topics to be covered will include: aspects of the chemistry of atmospheric precipitation, particularly the source of the acidity; the annual variations in the major ion composition of stream and lake (billabong) waters; the biogeochemistry of nutrients and heavy metals; and the pitfalls in estimating material fluxes in tropical streams.

THE OK TEDI PROJECT - AN OVERVIEW

R.J. Higgins, Ok Tedi Mining Ltd, P O Box 1, Tabubil, Papua New Guinea

The Ok Tedi Project is located in one of the most difficult mining environments in the world. Mining operations began in May 1984 after an exploration, feasibility and large scale construction program encompassing some 16 years.

A Project feasibility study proposed a tailings dam, and both erodable and permanent waste retention areas as a waste management strategy. Engineering difficulties and unforeseen natural events have led to a delay with this strategy.

In February 1986, the Government of Papua New Guinea and the Company formally agreed to a delayed construction schedule for waste retention facilities. A condition of the delay schedule is the completion of an Environmental Study by December 1988 to assess the extent and scope of waste retention facilities necessary to end of mine life.

This approach is designed to lead to an environmental management strategy for the Project which will satisfy the environmental demands of the system and therefore maintain a viable and responsible attitude to continuing mineral resources development in the region and the nation.

APPLICATIONS OF A TWO DIMENSIONAL RESERVOIR SIMULATION MODEL.

Dr. Graeme Hocking

Centre for Limnological Modelling, Centre for Water Research, University of W.A., Nedlands, 6009

ABSTRACT - The recently developed two-dimensional reservoir simulation model DYRESM-II has greatly increased the speed with which the movement of water, and hence particles in the reservoir, can be analysed. Water can be traced as it travels through the lake from the time of entry into the lake through one of the river inflows, until its 'final' location. Alternatively, spot tracers introduced at random locations can be similarly followed as they are moved around. The 'age' of the water in any part of the reservoir can be estimated at any time. These modelling capabilities have been used to examine questions of recreational use policies and water quality for Canning Reservoir in Western Australia.

EUASTACUS BISPINOSUS; IMPLICATIONS OF BIOLOGY AND ECOLOGY FOR MANAGEMENT OF AN AMATEUR FISHERY.

Jodie A. Hoey, Faculty of Applied Science and Technology,
Warrnambool Institute of Advanced Education,
P.O. Box 423, Warrrnambool 3280.

The reproductive cycle, early development, growth rate, density and distribution of the freshwater crayfish Euastacus bispinosus in the Glenelg Basin (Victoria) are being investigated. This will lead to more effective management of the amateur fishery for the species. Results to date indicate that significant differences exist between the life history and ecology of this species and other freshwater crayfish. These differences make E. bispinosus more vulnerable to fishing pressure, and thus pose problems for management.

ECOLOGICAL EFFECTS OF SEDIMENT ADDITION FROM URBAN LAND DEVELOPMENT ON THE MURRUMBIDGEE RIVER, A.C.T.

Ian D. Hogg and Richard H. Norris, Water Research Centre, Canberra CAE, P.O. Box 1 Belconnen, A.C.T.

Physical-chemical and biological characteristics of the Murrumbidgee River were examined, in pool areas, upstream and downstream of an urban creek. Suspended solids and turbidity were higher at downstream sites, and substratum particle size analysis revealed a higher proportion of fine inorganic material at downstream sites. Benthic macroinvertebrate numbers were lower at downstream sites for most taxonomic groups, with the exception of oligochaetes and chironomids which were occassionally collected in higher numbers downstream. It is suggested that the deposition of fine inorganic sediment and the unstable nature of settled material are possible causes for this reduction.

BIOLOGICAL TESTING OF RANGER URANIUM MINE WASTE-WATER: 1988 RESULTS

Douglas A. Holdway and Vince M. Brown, Alligator Rivers Region Research Institute, Office of the Supervising Scientist, Jabiru East, N.T. 5796.

The toxicity of waters from RP4 and RP2, two mine waste-water retention ponds at the Ranger Uranium Mine, were biologically tested relative to water from Magela Creek (to which release has been proposed). Tests used as many as 11 native species of aquatic organisms, including larval and juvenile fish, tadpoles, snails, hydra, clam-shrimp, water-fleas and duckweed. Up to 26 sensitive endpoints were assessed for each waste-water. Experiments involved 1-2 week continuous-flow exposures of organisms to nominal waste-water concentrations of 0, 0.3, 1.0, 3.2, 10, and 32%. RP4 waste-water toxicity was found to vary signficantly over time and between species; RP4 water collected Feb.25-28 was highly toxic to larval fish (NOEC <0.3%) but was effectively non-toxic (NOEC > 32%) to tadpoles, hydra and clam-shrimp. RP2 waste-water toxicity was also found to vary significantly between species, and was highly toxic (NOEC < 0.3%) to one species of larval fish, freshwater snail and water-flea, while being only moderately or non-toxic to three other species of juvenile fish, two species of hydra, and one species of clam-shrimp (NOEC = 3.2 - 32%). Recommended "safe" dilutions for each waste-water are calculated by applying a safety factor to the estimated threshold concentrations derived from the most sensitive species tested.

LEAF LITTER IN TWO SOUTHERN TASMANIAN CREEKS

by P. Horwitz and R.J. Carpenter

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Benthic and drifting leaf litter were examined in two parallel creeks in mixed forest in southern Tasmania, and the occurrence of whole leaves recorded. Similar proportions of leaves of each species were found in each creek. However, notable differences were found when proportions of leaf species in the drift were compared to those in the benthos, and when the proportions of drifting and benthic leaves were compared to those on the forest floor. It is proposed that the processes of litter input, leaf bouyancy and leaf breakdown are responsible for these differences and that the leaves of certain species will contribute unequally to the potential food source for freshwater invertebrates. We speculate that the processes will result in an unequal potential for fossilisation of the leaves of different species.

EFFECTS OF POLLUTION ON GENETIC STRUCTURE OF POPULATIONS

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Very little is known about the effects that pollution can have on genetic variability in natural populations. This paper presents preliminary data on the effects of chlorpyrifos, an organophosphate used widely in Queensland, on two widely occurring aquatic species, the mosquito fish, *Gambusia affinis*, and a shrimp, *Caradina sp.* For each species toxicity tests were carried out on samples from a number of sites, and resistant and susceptible individuals compared using cellulose acetate electrophoresis. Gene, genotype and heterozygote frequencies are compared between resistant and susceptible sets of individuals. The potential for the use of genetic structure of these species in monitoring pesticide pollution in freshwater ecosystems is discussed.

THE USE OF THE FRESHWATER MUSSEL, *VELESUNIO ANGASI*, IN THE LABORATORY AND FIELD ASSESSMENT OF TOXICITY OF MINE WASTE WATER RELEASES IN MAGELA CREEK, NORTHERN TERRITORY

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Other than their increasing use in bioaccumulation studies, scant attention has been paid to other roles that freshwater mussels might play in the monitoring of water quality and of pollution. Although they have been employed in the toxicity testing of waste effluents, such testing has rarely extended to acute and chronic effects in the sensitive early life stages. Further, many potentially sensitive attributes of adult physiology are not amenable to laboratory study. The assessment of toxicity of mine waste waters to organisms at the ARRRI is based on laboratory toxicity testing followed up and validated in the field by appropriate biological surveillance. Data are presented here to demonstrate the value and sensitivity of the freshwater mussel, *Velesunio angasi*, in both pre-release toxicity testing and field validation for the disposal of mine waste waters. Three sensitive stages in the life cycle have been employed in these assessments: the response of glochidial larvae ('snapping' behaviour) in pre-release testing, and the response of both newly-metamorphosed juveniles (growth and survival) and adult female mussels (reproductive activity) for the post-release field monitoring and verification of toxicity standards.

EFFECT OF MULTIPLE DISTURBANCE ON MACROINVERTEBRATE COMMUNITIES IN THE ACHERON RIVER, VICTORIA

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In riffles, patches of natural substratum (ca. 1 m^2) were disturbed every 10 days by kicking and raking. After 20 days a further set of patches was disturbed once, and for the next 70 days macroinvertebrate dynamics were monitored in the two sets of disturbed patches and also in contiguous control patches. There were no differences in the colonization pattern of total species richness, number of species per sample, the densities of individuals, or species heterogeneity (H) between the two disturbance regimes. The composition of the fauna colonizing each disturbance was similar, and after 20 days the fauna composition was similar in disturbed and control patches. The fauna appears to be well adapted to physical disturbance and current models linking species richness and disturbance cannot be readily applied to stream communities at the temporal and spatial scales of this experiment.

PHOSPHORUS MEASUREMENTS: HOW DO WE GET IT RIGHT?

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An examination was made of the concentration changes in four commonly measured phosphorus species after collection and storage. Total [P] and total filterable [P] showed no change after storage (8 days). Dissolved reactive [P] was higher after storage while total reactive [P] was lower after storage.

Important questions arose that should be answered at the design stage of a project.

1) Which species of phosphorus are of biological significance and should be measured?
2) What are the levels of phosphorus that will effect an organism or a community?
3) Can we/you accurately measure the phosphorus species.

AUSTRALIAN TILAPIA POPULATIONS: A SINGLE PROBLEM?

Dr. Peter Mather, Dept. of Biology, Queensland Institute of Technology, G.P.O. Box 2434, Brisbane, Q, 4001.

Populations of the potentially noxious introduced cichlid, tilapia are established in a number of disjunct localities in Queensland and Western Australia. Feral populations are believed to have developed from releases of fish brought into the country for the Aquarium trade. This paper examines the taxonomy and relationship of the wild Queensland populations using gel electrophoresis to determine whether feral populations have resulted from a single introduced stock or from a number of stocks which may have been genetically distinct. This data may help to assess whether wild populations can be addressed as a single problem

FISH AND INVERTEBRATE MONITORING IN THE HEADWATERS OF THE SOUTH ALLIGATOR RIVER, A PERENNIAL STREAM IN THE WET/DRY TROPICS OF THE N.T.

Maryanne McKaige, DAMES AND MOORE,-GPO Box 2005, Darwin NT, 5794.

This one year study has been funded by BHP as a preliminary to establishing suitable aquatic monitoring techniques for the South Alligator River in the event of mining at Coronation Hill. Two, three monthly sampling runs have been processed to date and the results form the basis of this paper. Sampling of riffle macroinvertebrates has yielded a diverse and abundant fauna similar in many ways to the structure of communities in temperate streams. Disturbance by buffalo is believed to have contributed to the between site variability observed over the dry season. Complementary to the macroinvertebrate work is sampling of small tropical fish species using seine netting (primarily to establish size classes) and an innovative, non-destructive visual censusing technique to estimate relative abundance and community composition of the fish fauna.

OPTICAL CHARACTERISTICS OF WATERS IN THE MURRAY-DARLING BASIN

Rod. L. Oliver. Murray Darling Freshwater Research Centre, Albury.

High turbidity and colour are characteristic features of many aquatic environments in the Murray-Darling Basin, and affect the optical quality of the water by reducing light transmission. This has important implications both aesthetically and ecologically. The optical quality of water is dependent on the concentration of absorbing and scattering components dissolved, or suspended within it. The relative importance of absorption and scattering in reducing light transmission cannot be easily determined, and requires in situ measurements of the light field, as well as the application of empirical models inter-relating fundamental optical properties. In each case the suitability of the selected model must be verified and the experimentally determined optical properties shown to be consistent with theory. During 1986-1987 measurements were made on a range of waters from the Murray-Darling basin with the aim of characterising as completely as possible their optical properties. Light profiles were measured along with turbidity, chlorophyll and the absorption spectra of colour and of particles. The applicability of Kirk's empirical model for calculating the scattering coefficient was tested for these waters and found to be suitable for all except those with very high chlorophyll concentrations. Large variations in scattering and absorption coeffocients were found between waters.

LIMNOLOGY IN PAPUA NEW GUINEA: PROGRESS, PROSPECTS AND PROBLEMS

P.L. Osborne, Biology Department, University of Papua New Guinea, P.O. Box 320, National Capital District, Papua New Guinea.

Papua New Guinea is a wet country and this contrasts markedly with its dry southern neighbour. There are some 5000 lakes greater than 0.1 ha in area in PNG and most of these are associated with two very large rivers: the Sepik and Fly. Both these rivers have mean annual discharges in excess of 10 000 cumecs. Run-off from these two rivers is equal to approximately half that from the entire Australian continent. Most limnological work has been very applied and includes studies on fish introductions, aquatic weed control and the impacts of tailings disposal and reservoir construction. The taxonomy of freshwater organisms, with possible exceptions of the zooplankton and freshwater plants, is poorly known. Opportunities for tropical limnological studies abound: progress has been slow, prospects are excellent, problems are many and varied but not insurmountable.

PRODUCTION OF AN ODOURIFEROUS COMPOUND, GEOSMIN, BY AN ANABAENA SP..

A.J. Padovan[1], W. Korth[2], R.L. Oliver[3], and K. Bowmer[2]
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Anabaena spiroides, a bloom forming cyanobacteria, was isolated from the Murrumbidgee River. Cultures were grown in the laboratory to determine the organisms capacity to produce odouriferous compounds. The presence of an earthy/musty odour was detected by an odour testing panel. Concentration of volatile products by closed loop stripping, and analysis by capillary gas chromatography fitted with a mass selective detector, identified geosmin as the main compound responsible for the odour. Tests with the odour panel confirmed reports that geosmin can be problematic at concentrations as low as 11ng/L.

The concentration of geosmin in culture was positively correlated to algal biomass, measured as chlorophyll. This relationship was maintained even when cellular chlorophyll content was altered by varying the light regime, suggesting a link between geosmin and chlorophyll synthesis. The implications of these results to field conditions and water management will be discussed.

A REVIEW OF THE FIRST PHASE OF THE YARRA RIVER BIOLOGICAL MONITORING PROGRAMME.

Vincent Pettigrove, Rural Water Commission of Victoria.

A long term monitoring programme of the Yarra River macroinvertebrate communities was established in December 1983 in co-operation with the Environment Protection Authority of Victoria. The first phase of this programme has assessed the degree of spatial and temporal trends in the fauna collected from ten locations on seven occasions between December 1983 and December 1986, and has related these changes to various physico-chemical factors and catchment activities.

The condition of the fauna progressively deteriorates from the virtually pristine headwaters, to cleared rural areas in the mid-Yarra, to urban areas in the lower sections. The changes are influenced by nutrients, turbidities, and in the lower Yarra, toxic substances. Short term changes in the fauna occur in relation to prevailing flow regimes, sedimentation and seasonal factors.

A broad spectrum of techniques were applied to the data and their effectiveness in detecting long term faunal changes is discussed.

GONADAL MORPHOLOGY & REPRODUCTIVE MODE IN LEPIDOGALAXIAS SALAMANDROIDES

B J Pusey - Centre for Catchment & In-stream Research. Griffith University.

Fertilization in this species is internal but larval development occurs in the aquatic environment. Although the sperm is stored for some time fertilization only occurs just prior to oviposition. Both male and female gonads are highly modified as is the anal fin of the male. The evolution of these structures and mode of reproduction is discussed with respect to the life history of the species.

THE INFLUENCE OF DEPTH ON EMERGENT MACROPHYTE DEMOGRAPHY.

Naomi Rea Botany Dept. University of Adelaide.

Adverse environmental changes usually preceed plant invasions. At Bool Lagoon the increased and prolonged water levels appear to facilitate the expansion of TRIGLOCHIN PROCERA and retreat of BAUMEA ARTHROPHYLLA populations. The demographic response of these species to an increase in water depth will be presented. Results suggest that the change in plant distribution is an interaction between the aggressive advance of TRIGLOCHIN and the passive retreat of BAUMEA.

ARTIFICIAL WETLAND WASTEWATER TREATMENT: WHY ARE UP-FLOW EXPERIMENTAL SYSTEMS SO EFFECTIVE?

K.H. Rogers, P.F. Breen, A.J. Chick. CSIRO, Griffith.

Do low loading rates create a false impression or has the ideal of plug-flow hydraulics been achieved? Systems of contrasting up- and down-flow hydraulic formats were compared at increasing nutrient and effluent loads over 38 weeks. Different patterns of root growth created distinct below ground chemical environments and greatly modified internal hydraulics but efficiency, which greatly exceeded that of published studies, was similar for both up- and down-flow systems. A hydraulic format which opposes g ravity ensures maximum contact of wastewater with the roots in systems where plant uptake accounts for 80% of nutrient removal. In trench systems, where flow is perpendicular to gravity, short circuiting which reduces treatment efficiency is inevitable.

PREDATORY VERSATILITY IN DRAGONFLY LARVAE

R.J. Rowe, Dept., of Zoology, James Cook University, Townsville, 4811

Larval Hemianax papuensis display predatory versatility (the use of disparate pre-specific behaviours). Both unlearned and learned behaviours occur. The predatory behaviour is interpreted in light of the animals' ecology.

IMPACT OF THE OK TEDI MINE ON THE FISHES OF THE FLY RIVER SYSTEM.

Ross Smith Environment Dept. Ok Tedi Mining Limited P.O. Box 1 Tabubil W.P. Papua New Guinea.

The fish communities of the Fly River system have been routinely monitored since April 1983, after construction of the Ok Tedi mine commenced, but before operations commenced in May 1984. No mine related changes in the fish communities in the Fly River below the junction with the Ok Tedi have been observed against a high level of variability such that minor changes might not be detected. Two sites have been monitored in the Ok Tedi itself. At Ningerum, the site closest to the mine, overall fish abundance and diversity have been maintained, but the average fish biomass has declined. There has been an increase in sediment tolerant species and a loss of sediment intolerant species. Further downstream in the Ok Tedi at Atkamba abundance, diversity and biomass appear to have declined, although catches remain higher than at Ningerum. Comparisons with the naturally highly turbid Strickland River, a tributary of the Fly River, indicate that further increases in the turbidity of the Fly River could result in changes in the species composition while maintaining diversity and standing stock.

THE LIFE HISTORY OF AUSTRALATYA STRIOLATA (McCULLOCH & McNEILL)

Ross Smith Environment Department Ok Tedi Mining Limited P.O. Box 1 Tabubil W.P. Papua New Guinea.

The life history of Australatya striolata (McCulloch and McNeill), an upland rainforest stream shrimp, was examined in two stream systems in north Queensland. A. striolata is a protandrous hermaphrodite, and was shown to have a very stable bimodal size frequency distribution, with one mode for each sex. Further analyses of the size frequency distributions and mark-recapture data indicated that the adults probably survive in excess of five years and have a two stage growth curve. Reproduction was shown to be confined to the summer wet season, with the larvae hatching as lecithotrophic zoea which require high salinity for further development. Following larval development, juveniles migrate upstream. This migration may take in excess of twelve months. As this method of reproduction must result in high larval and juvenile mortalities, it is proposed that the stable size frequency distributions and densities of adult populations are maintained by the two stage growth curve and low adult mortalities.

THE IMPORTANCE OF OVIPOSITION IN LIFE HISTORY SYNCHRONY AND FLEXIBILITY OF TWO SPECIES OF LEPTOCERIDAE (INSECTA:TRICHOPTERA).

Ros St Clair
Zoology Department, James Cook University, Townsville 4811

The synchrony of a population of Leptorussa darlingtoni (Banks) in the Lerderderg River, Victoria, was found to be influenced primarily by the requirement of rainfall to initiate oviposition. Comparison with published data for a South Australian population of this species indicate a similar influence on synchrony and a probable influence on the flexibility of timing of the life cycle.

While little data on oviposition were collected for the Lerderderg River population of Triplectides truncatus Neboiss, a similar increase in sychrony following oviposition was apparent.

The implications of the importance of oviposition requirements in a highly variable habitat are discussed.

A MULTIVARIATE APPROACH TO IN-STREAM IMPACT ASSESSMENT: THE NORTH DANDALUP DAM, WESTERN AUSTRALIA

A.W. Storey, Aquatic Research Laboratory, Zoology Department, The University of Western Australia, Nedlands, Western Australia 6009.

Riffle zones at eleven sites in the North Dandalup Catchment were quantitatively sampled on a three monthly basis over 3 years. The resulting database on macroinvertebrate community structure has been analysed with DECORANA and TWINSPAN to determine the degree of spatial and temporal variation and to identify associated environmental variables.

A reduced array of environmental variables were successfully utilised to predict macroinvertebrate community structure, using Multiple Discriminant Analysis. From these data, a model has been developed in which variables likely to be influenced by dam construction may be altered to facilitate predictions of the effects on community structure.

A long term monitoring programme, with reduced frequency and intensity of sampling has been designed and is being implemented to follow in-stream changes associated with dam construction.

THEORETICAL LIMNOLOGY

Milan Straskraba, Biomathematical Laboratory, Czechoslovak Academy of Sciences. Ceske Budejovice, 37005 Czechoslovakia

Geographical latitudinal differences between lakes were theoretically evaluated by empirical models. Latitude is recognized as a composite variable, to be understood only by separating the individual driving forces. The lake is a niche and can be only understood as a point in the multidimensional spaces of variables. An analysis of altitudinal differences shows a possibility to separate the effects of light and temperature. Oceanic versus mainland climates at the same latitude (and altitute) can be predicted from theoretical reasoning and were observed e.g for lakes of New Zealand. Adaptation of organisms to the environmental conditions plays a major role in explaining geographical (and other) differences, and corresponding ecological theory has to be extended.

IMPACT OF SEWAGE EFFLUENT ON THE BENTHIC INVERTEBRATE COMMUNITY OF THE UPPER THREDBO RIVER.

D. Tiller[1] and R.H. Norris[2] 1. Victorian Environmental Protection Authority, 471 Collins St Melbourne 3000. 2. School Applied Science, Canberra CAE, P.O. Box 1 Belconnen ACT 2616

Treated sewage effluent from Thredbo Village is discharged to the upper Thredbo River, a rocky bottomed, high mountain stream (>1200 m) flowing mostly through subalpine woodland. Upstream of Thredbo Village phosphorus and nitrogen were less than 20 mg m^{-3} and 100 mg m^{-3} respectively while the sewage had up to 5,000 and 28,000 mg m^{-3} respectively. Phosphorus returned to concentrations similar to upstream by 3.5 km downstream of the effluent discharge. Nitrogen concentrations often remained elevated to 8 km downstream. In January 1983, immediately downstream of the effluent discharge, the composition of the invertebrate fauna was not very different from that upstream, although there was a significant increase in the abundance of the taxa favoured by an increased growth of filamentous algae. The changes in the benthic macroinvertebrate community were not evident 3.5 km downstream of the effluent discharge, corresponding to the return of phosphorus concentrations to upstream levels. Higher flows and low temperatures during April and July 1983 had more influence on the distribution and abundance of the benthic fauna than the effluent discharge.

MURRAY-DARLING BASIN NATIVE FISH MANAGEMENT PLAN.

Richard Tilzey, Bureau of Rural Science, DPIE, Canberra.

The Murray-Darling Basin Commission has allocated funds to develop a management plan for the fishes of the Murray-Darling system. The Project Brief was advertised nationally in 1987 but, following a limited response from consultants, it was decided that a plan would be prepared by a panel comprised of acknowledged authorities in Murray-Darling fish from both government and non government organisations. To this end, a Steering Committee of one scientist from each of the NSW, SA & Vic Fisheries Depts & the MDBC, CCAE & BRS has been formed and a workshop involving numerous fisheries scientists is to be held in Canberra in June of this year.

The major aims of the plan, which centres on implementing practical remedial options to overcome the decline in native fish stocks are outlined. Emphasis is placed on manipulating hydrologic operations to benefit fish stocks and on improving fish passage, but other management strategies are also discussed. Comments and suggestions are welcome. Whereas funding constraints have neccessitated the workshop/planning being confined to those of a piscine persuasion, it is clearly recognised that fish are but one component of the aquatic biota and it is hoped that the final management plan will incorporate a considerable voluntary (or solicited!) input of pertinent limnological expertise.

SOME CHARACTERISTICS OF TROPICAL RAINFALL, RUNOFF, AND RIVER FLOW

R.E. Volker, Australian Centre for Tropical Freshwater Research, James Cook University

The tropics are characterised by the potential for high rainfall intensities not only in the wet rainforests but also in the semi-arid or dry tropics. Absolute magnitude of intensities and their frequencies of occurrence differ markedly, of course, from the wet to the dry tropics. Runoff and subsurface moisture redistribution processes depend on the rainfall pattern, catchment topography, and soil hydraulic properties. Examples of results from the literature are presented to demonstrate the factors which control the surface and subsurface transport of water. Streamflow statistical properties are of paramount importance in determining the practicality of storage and supply for domestic water consumption and irrigation. Relevant statistical parameters for tropical streams are compared with those from other climatic zones and the implications for water supply are discussed.

LIGHT-GENERATED REACTIVE INTERMEDIATES IN TROPICAL WATERS

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Dissolved organic substanced in natural waters absorb a major position of incoming solar radiation resulting in generation of a range of particularly active species including excited state dissolved organic materials, peroxy radicals, superoxide ion and hydrogen peroxide. While these species do not pose a risk to human health at the concentrations found in natural waters, they may affect the viability of primary producers and certainly affect transformation of natural and man-made compounds. Of particular interest are their affects on the the speciation of redox-active metals such as iron, manganese and copper. The results of investigations into the generation of reactive intermediates in Australian tropical waters will be presented and the effects on the speciation of iron and manganese discussed.

PARATYA AUSTRALIENSIS IN A SOUTHERN AUSTRALIAN ESTUARY-VAGRANT, DRIFTER OR RESIDENT?

C.J. Walsh
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The distribution of *Paratya australiensis* in the Hopkins River estuary, Western Victoria, was monitored over one year. Adults did not occur for two months after peak discharge, but thereafter were collected in salinities up to 10‰. This suggests that their occurrence in the estuary was not passive. Post-larval juveniles inhabited the upper end of the estuary throughout the year in salinities which ranged from 0.1 to 23‰, and exceeded 17‰ for three months. Such a degree of penetration into estuaries by *P. australiensis* has not been reported previously. It is hypothesised that the species actively migrates into the estuary in periods of low flow, for use as a nursery. The implications of this behaviour for a lotic organism with a planktonic larval stage is discussed, as is the potential for competitive interaction with the estuarine *Macrobrachium intermedium*. Further work on the ecology and physiology of the caridean shrimps of the estuary is planned.

CONVECTION THROUGH PERMEABLE STREAM BEDS

Ian Webster, John Knight, Alfred Uhlherr, CSIRO Centre for Environmental Mechanics, GPO Box 821, Canberra, ACT, 2601, Australia

In recent years, some investigators have observed that the exchange of interstitial water with the overlying free stream is much quicker than would occur if this exchange were determined by molecular diffusion alone. It has been postulated that this increased exchange is due to a convective transport within the stream bed driven by either turbulent or stationary pressure variations occurring along the stream bed surface. In this paper, we investigate two such sub-surface flows associated with (a) the presence of a stone on the bottom and (b) free-stream turbulence. The stone is an efficient agent for generating flows within the sediments surrounding it, whereas the free-stream turbulence is not except perhaps within coarser sediments.

Title Where and What are the wetlands of the Lachlan Valley?

P.D. Wettin, M.A.W. Bennett, F.H. Keenan and P.C. Knights - Department of Water Resources , N.S.W.

The wetland resource of the Lachlan Valley has been classified, mapped and inventoried in a consistent fashion over the past few years such that there is a clearer understanding of that resource. We now know there are some 400,000 ha of wetland of varying sizes and characteristics.

A picture is also becoming clearer of the "manageability" of the Lachlan wetlands although the desirability and implications of management is somewhat more clouded and difficult. This is par ticularly the case when management of water into and within wetland areas is considered.

This paper reviews the current status of the Department's Lachlan Valley wetland investigations.

SPECIES RICHNESS IN TROPICAL FRESH WATERS OF AUSTRALIA

W.D. Williams, Department of Zoology, University of Adelaide, and
R.J. Shiel, Murray-Darling Freshwater Research Centre

Until recently it was generally assumed by limnologists that diversity in tropical fresh waters was greater than in temperate fresh waters. However, modern evidence is beginning to indicate that this may not be true: it is now suggested by certain authors (e.g. Payne, 1986; and Lewis, 1987) that the reverse may be the case. Thus far, Australian information on this matter has been ignored. The data base, nevertheless, is slim. Because of the form of Australia's eastern coast, which stretches unbroken from tropical to temperate climates, Australian information on the matter is uniquely important. In this paper, we examine the evidence provided by various groups of the fauna.

KIDNEY STONES : THEIR ROLE IN NUTRIENT REDUCTION OF PIGGERY EFFLUENT

by T.J. Wrigley, School of Environmental and Life Sciences, Murdoch University, 6150

Struvite($Mg\ NH_4PO_4$) is a crystalline precipitate which occurs in the kidneys of animals and man. Struvite also is a common precipitate in the pipes of waste water treatment plants.

Large quantities of struvite have been found to precipitate out in the pipes leading from three waste stabilization lagoons at a large piggery (20000 pigs) near Mandurah, Western Australia. This precipitate occurs because the effluent is supersaturated at pH values between 7 and 8 with Magnesium(Mg^{2+}) from ground water and feed wastes, Ammonia-Nitrogen ($N\text{-}NH_3$) from urine and Phosphate-Phosphorus ($P\text{-}PO_4$ from urine and faeces.

Struvite is a valuable by product particularly as a slow release fertilizer and as a concrete material. The precipitation of struvite also removes the major plants nutrients, PO_4^{3-} and NH_4^+ and this aspect will be discussed with respect to the piggery effluent.

LIFE WITHOUT STONEFLIES ON BOUGAINVILLE ISLAND

Cathy Yule, C/O B 37 A, B.C.L., Panguna, Bougainville Island, Papua New Guinea.

Konaiano Creek is a small tropical rainforest stream on Bougainville Island, P.N.G.. It has been studied since July 1987 with the aim of investigating the seasonality of the life histories of its invertebrate inhabitants This paper gives a preliminary account of the stream and its fauna. The creek is situated on a steep mountainside between 700 and 1000 m a.s.l., 38 km from a highly active volcano. The temperature is fairly constant throughout the year (monthly mean 22.8 - 24°C) and rainfall is high (annual mean 4366mm) with little seasonal variation in precipitation. The annual variation in day length is only about 20 minutes. The fauna of the stream is dominated by simuliids (more than 50%), hydropsychids, baetids and chironomids. Unfortunately Plecoptera are absent. Faunal abundance appears higher than that of other tropical streams studied, however species richness appears to be relatively low.

(POSTER PRESENTATION)

LIMNOLOGY AND THE AUSTRALIAN JOURNAL OF MARINE AND FRESHWATER RESEARCH.

A. Grant, CSIRO Editorial Service, P.O.Box 89, East Melbourne, 3002.

The journal is distributed in over 80 countries. The contents pages are listed in *Current Contents*, and papers are abstracted by the major abstracting services.
To date, 25% of the papers accepted for publication during 1988 are related to limnology. This is the lowest percentage achieved by limnology papers in the past ten years, and reflects a high rejection rate rather than a low number of submissions.

THE ECOLOGICAL IMPACT OF A SALINITY BARRIER IN THE SONGKHLA LAKES SYSTEM, THAILAND

D.S. Mitchell,
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The Songkhla Lakes system comprises a chain of four coastal lakes flowing from a large wetland to the sea. These lakes, Thale Noir, Thale Luang, Thale Sup and Thale Sap Songkhla are increasingly influenced by saline intrusion from the sea during the dry season, but are flushed out by annual floods in the wet season. A salinity barrier across the lakes has been proposed as a means of preventing saline contamination of freshwater in the upper part of the system. If the barrier is built between the upper two and the lower two lakes, i.e. between Thale Luang and Thale Sap, there will be little impact on the system as there is normally very little saline influence above this point. However, if the barrier is built between Thale Sap and Thale Sap Songkhla, the former lake will become a permanently freshwater system. The change from brackish water to fresh water in this lake is predicted to cause serious water weed problems mainly from the water hyacinth already present in the system. The plant is likely to cover about 20 km^2 of the lake in about 120 days. Evapotranspiration losses from such a weed mat could remove as much additional water as the barrier would store. Such a mat would weigh about 200,000 tonnes and would imperil the barrier and other lakeside structures when swept out of the lake by the annual floods in december-January. because of this and other factors, the lower barrier is preferred.

A PROPOSED METHODOLOGY FOR THE MEASUREMENT OF STREAM COMMUNITY METABOLISM

By Peter Davies, Zoology Department, University of Western Australia.

In recent years, considerable attention has centred on process-orientated aspects of stream ecology, emphasising the sources and pathways of energy in streams and rivers. Much of this work originated from the northern hemisphere, and as a consequence, most of our current knowledge of the functional organisation of stream communities is based on temperate forest systems. However, Australian streams have differences in both the timing and nature of litter inputs, which may distinguish them from their overseas counterparts. In these studies, mass transfer experiments, usually measuring the dynamics of oxygen in solution, have been used to derive photosynthesis to respiration ratios (P/R) of community metabolism. A P/R <1 has been used to indicate "heterotrophy" and therefore a reliance on allochthonous inputs

from the surrounding catchment and a P/R >1 indicating "autotrophy", where most of the energy is elaborated by primary producers within the stream. Using these statistics, headwater streams have been described as heterotrophic, whilst autotrophy is thought to increase in importance longitudinally downstream.

However, few studies have critically examined the available methodology when deriving P/R ratios, particularly when using oxygen transfer, similarly the present terminology can be misleading and is often misapplied. The dynamics of oxygen in solution can be modified by temperature, pressure and diffusion as well as the stream community, necessitating careful control or measurement and allowance of these physical parameters. Similarly, stream communities are sensitive to water velocity and demonstrate a non-linear response to decreasing oxygen tension. The method and frequency of measurement, whether chemical or electronic, may introduce error and is important when designing and interpreting experiments on community metabolism. This paper will examine the available methodology of experiments on community metabolism using P/R ratios, re-interpret previous results and propose methods to overcome many of the associated difficulties.

For those limnologists who have to venture into....

The Tropics.....

The Temperate climes (near estuaries).....

LIMNOLOGY BIBLIOGRAPHY

Looks as though the pressures of other tasks are taking over the time normally given to publication. The flow of papers for the bibliography has slowed, but I have received these papers over the last few months. Please forward titles, abstracts, reprints, or citations to R. Tait, C/- Esso Australia Ltd., P.O. Box 4047, Sydney, N.S.W., 2001.

1987:

Bayly, I.A.E. & Burton, H.R. Vertical distribution of *Paralabidocera antarctica* (Copepoda : Calanoida) in Ace Lake, Antarctica, in summer. *Aust. J. Mar. Freshwater Res.* 38(4): 537-543.

Berra, T.M., Campbell, A. & Jackson, P.D. Diet of the Australian grayling, *Prototroctes maraena* Gunther (Salmoniformes : Prototroctidae) with notes on the occurrence of a trematode parasite and black peritoneum. *Aust. J. Mar. Freshwater Res.* 38(5): 661-669.

Brumley, A.R., Morison, A.K. & Anderson, J.R. Revision of the conservation status of several species of warmwater native fish after surveys of selected sites in northern Victoria (1982-1984). *Arthur Rylah Institute for Environmental Research: Technical Report No.* 33.

Burton, E.M. and Mitchell, B.D. Moult staging in the Australian freshwater crayfish, *Cherax albidus* Clark and *Cherax destructor* Clark (Decapoda : Parastacidae), via uropod setal development. *Aust. J. Mar. Freshwater Res.* 38(4): 537-543.

Chessman, B.C. & Williams, W.D. A note on the diet of *Galaxias maculatus* (Jenyns) (Pisces, Salmoniformes, Galaxiidae) in a closed saline lake in western Victoria. *Bull. Aust. Soc. Limnol.* 11: 43-46.

Coates, D. Observations on the biology of tarpon, *Megalops cyprinoides* (Broussonet) (Pisces : Megalopidae), in the Sepik River, northern Papua New Guinea. *Aust. J. Mar. Freshwater Res.* 38(4): 523-528.

Doeg, T.J. Macroinvertebrate communities in the Goulburn River and tributaries above Lake Eildon, Victoria. *Bull. Aust. Soc. Limnol.* 11: 47-

Hogan, A.E. & Nicholson J.C. *Short Communication*: Sperm motility of sooty grunter, *Hephaestus fuliginosus* (Macleay) and jungle perch, *Kuhlia rupestris* (Lacepede), in different salinites. *Aust. J. Mar. Freshwater Res.* 38(4): 523-528.

Jones, A.R. Temporal patterns in the macrobenthic communities of the Hawkesbury estuary, New South Wales. *Aust. J. Mar. Freshwater Res.* 38(5): 607-624.

McKaige, M.E. Comparison of two net emptying frequencies in the assessment of drift sampling as a potential biological monitoring tool. *Bull. Aust. Soc. Limnol.* 11: 33-42.

Moore, L.S. Water chemistry of the coastal saline lakes of the Clifton-Preston lakeland system, south-western Australia, and its influence on stromatolite formation. *Aust. J. Mar. Freshwater Res.* 38(5): 647-660.

Morison, A.K. & Anderson, J.R. Status of Trout cod *Maccullochella macquariensis*, Macquarie perch *Macquaria australasica*, and other fish populations in the upper reaches of Seven Creeks, based on surveys between 1981 and 1987. *Arthur Rylah Institute for Environmental Research: Technical Report No. 59.*

O'Keefe, M.A. & Lake, P.S. The decomposition of pine, eucalypt and *Acacia* litter in a small upland Victorian stream. *Bull. Aust. Soc. Limnol. 11*: 15-32.

Timms, B.V. & Watts, C.H.S. Water beetles of salt lakes near Colac, Victoria. *Bull. Aust. Soc. Limnol. 11*: 1-8.

Timms, B.V. Colonization of two large farm dams on the central coast of New South Wales by crustacean zooplankton. *Bull. Aust. Soc. Limnol. 11*: 9-14.

1988:

Humphries, S.E. & Lyne, V.D. Cyanophyte blooms: The role of cell buoyancy. *Limnol. Oceanogr.* 33(1): 79-91.

"But you had a fiver only last week."

COMING EVENTS

1988

28-30 JUNE : National Fisheries Forum and Exhibition '88 - Managing the marine environment for a fishing future. Contact : Ms Dawn Couchman, National Fisheries Forum and Exhibition 88, PO Box 344, Fortitude Valley, Qld. 4006.

10-15 JULY: Conference on water quality and management for recreation and tourism, Brisbane. Contact: R. Sadler, PO Box 388, North Quay Qld 4000.

18-22 JULY: Society of Protozoologists 1988 Scientific Meeting, Bristol, England. Contact Dr E. Kaneshiro, Biological Sciences, University of Cincinnati, Cincinnati, Ohio, 45221-0001, USA.

25-28 JULY: 10th International Symposium on Chironomidae, Debrecen, Hungary. Contact: Dr Gy. Devai, Secretary, Department of Ecology, L. Kossuth University, PO Box 14, M-4010 Debrecen, Hungary.

6-16 AUGUST : SLEADS* Conference '88 (*Salt Lakes, Evaporites and Aeolian Deposits) Arid zone hydrology, geochemistry, biology, stratigraphy and palaeoenvironments. Australian research with global comparisons. Contact: Dr Allan Chivas, Research School of Earth Sciences, ANU, GPO Box 4, Canberra ACT 2601.

14-19 AUGUST: Third International Phycological Congress. Monash University. Contact Margaret Clayton, Botany Department, Monash, Clayton, Victoria, 3168.

15-19 AUGUST: Fourth International Symposium on Regulated Streams, University of Technology, Loughborough, England. Contact: Dr G.E. Petts, Department of Geography, University of Technology, Loughborough, Leicestershire, LE11 3TU, UK.

20-27 AUGUST: Third International Desmid Symposium and Second International Phytoflagellate Workshop (auspices of SIL and IPC), concurrent, Bronte Park, Tasmania. Contact Peter Tyler, Botany Department, University of Tasmania, Box 252C, GPO, Hobart, Tasmania, 7001. Telephone (002) 202 623.

28 AUGUST - 2 SEPTEMBER: Australian ecosystems: 200 years of utilization, degradation and reconstruction, Ecological Society of Australia, Geraldton, WA. contact: Dr R.A. How, Symposium Secretary, ESA, Western Australian Museum, Francis Street, Perth WA 6000.

29 AUGUST- 2 SEPTEMBER: First biennial water quality symposium: Microbiological aspects, Banff, Canada. Co-sponsors, WHO, PAHO, IDRC Ottawa, EC H & WC. AE. Contact: B.J. Dutka or D. Liu, National Water Research Institute, PO Box 5050, 867 Lakeshore Road, Burlington, Ontario, Canada L7R 4A6.

11-17 SEPTEMBER: Third International Conference on the conservation and management of lakes "Balaton '88", Hungary.

Contact: Dr Sandor Herodek, Balaton Limnological Research Institute of the Hungarian Academy of Sciences, Tihany, POB 35, Hungary 8237.

12-13 SEPTEMBER: National Symposium on the Management Of Invasive Aquatic Animals. Contact Mrs F. Bierman, Foundation for Research Development, CSIR, PO Box 395, Pretoria, 0001.

1989

30 MAY-1 JUNE: ACADS Watercomp '89. The first Australasian conference on technical computing in the water industry. Contact The Conference Manager, Watercomp '89 Conference, The Institution of Engineers, Australia, 11 National Circuit, Barton, ACT, 2600.

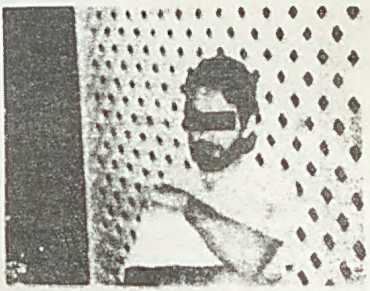
7-10 JULY : ASL 28th Congress and AGM Canberra CAE, Belconnen ACT. Contact: Dr R. Norris, Water Research Centre, School of Applied Science, CCAE, PO Box 1, Belconnen ACT 2616.

1990

23-30 AUGUST : V International Congress of Ecology "Development of Ecological Perspectives for the 21st Century", Yokohama, Japan. Contact: Secretary General's Office for Intecol 1990, Institute of Environmental Science and Technology, Yokohama National University, Yokohama 240, Japan.

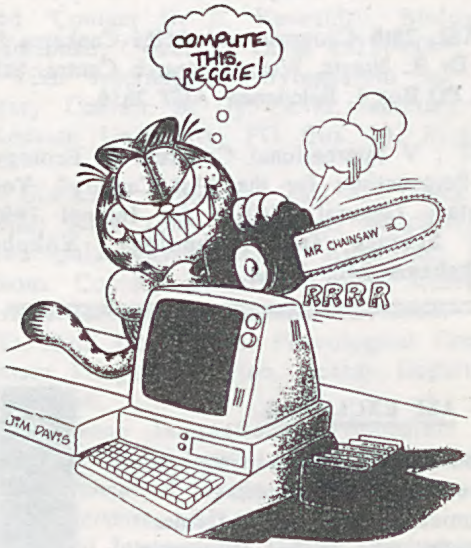
STOP PRESS - ASL EXCLUSIVE

.....and just when you thought all the news had finished we give you this most newsworthy item, communicated to us by a former north Queensland reader who wishes to remain anonymous!



Lover gets nasty bite

LONDON — A jilted lover burst into his former girlfriend's bedroom to tackle his rival and bit the other man's penis, inflicting a "horrific" wound which needed six stitches, a court heard yesterday. Victim Richard Pearson was naked and helplessly entangled in bedclothes as Denise Storey threw herself over his head to protect him from jilted Ken Mercer's punches. The case was adjourned until today.


COMPUTE THIS, REGGIE!
MR CHAINSAW
RRRR
JIM DAVIS

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